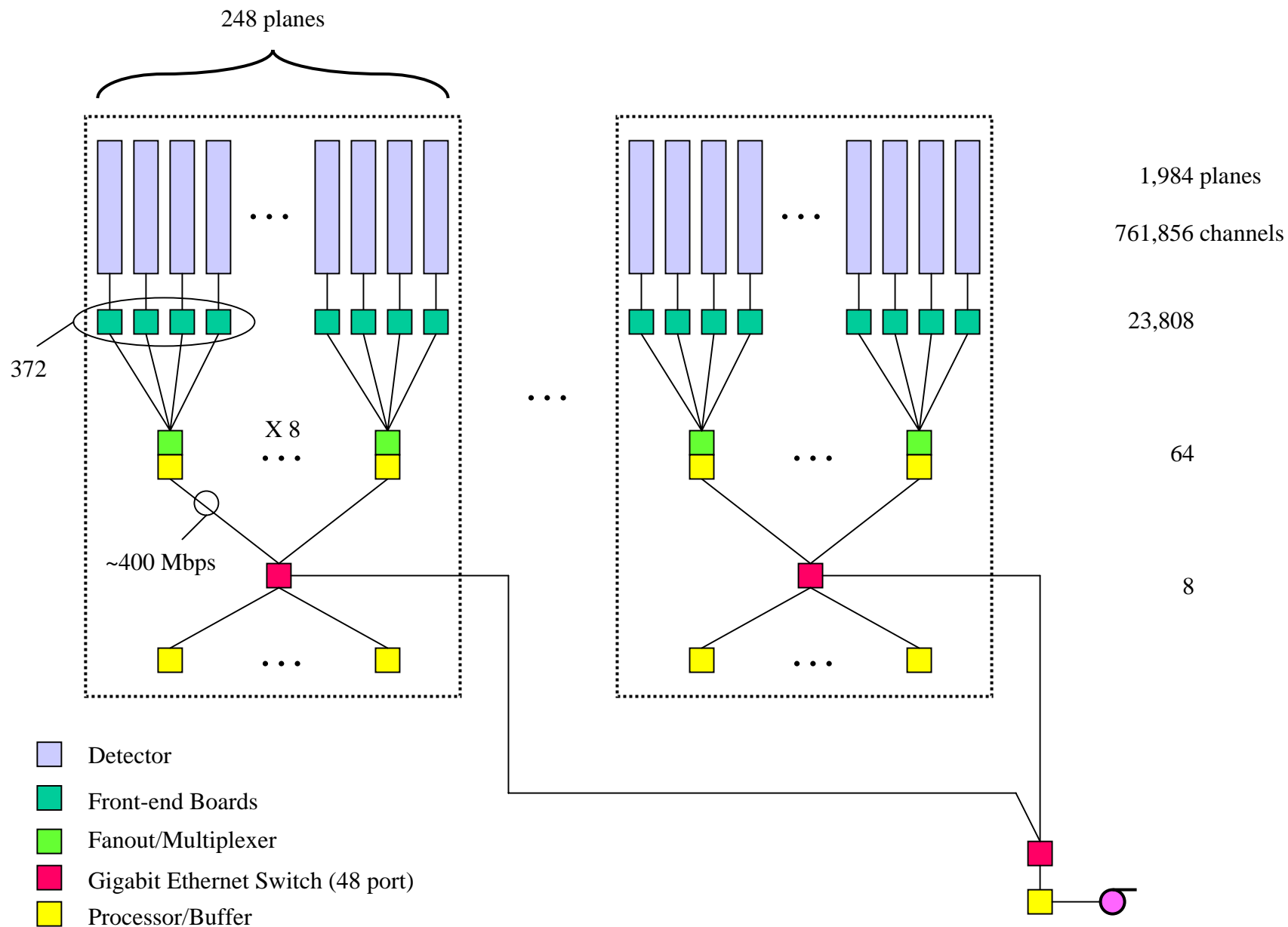# Nova DAQ

First proposal was for a completely Ethernet based readout system

       Advantages - no custom hardware required, fast implementation, lower development cost, direct high level communication with front-end boards for control and diagnostics.

       Disadvantages - higher material cost, 100Mbps links to front-end are "overkill" for the expected data rate.

There now seems to be some consensus that the first layer of multiplexing should be based on custom hardware.
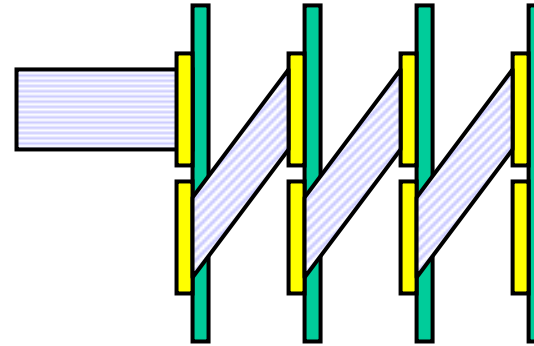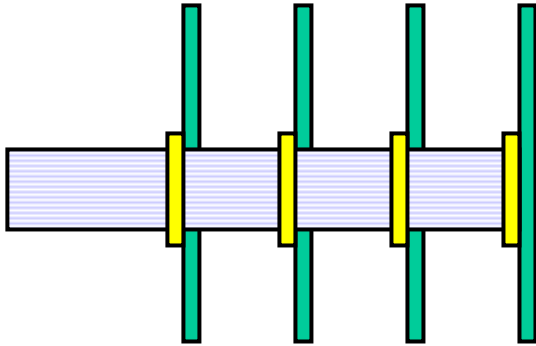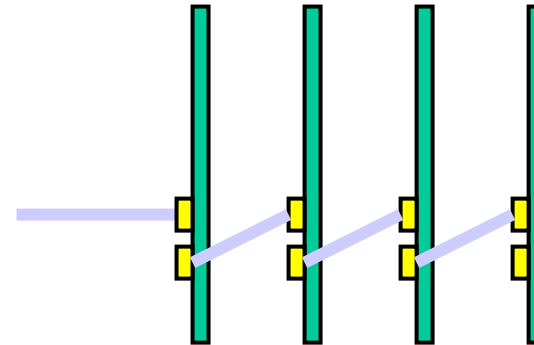
248 planes

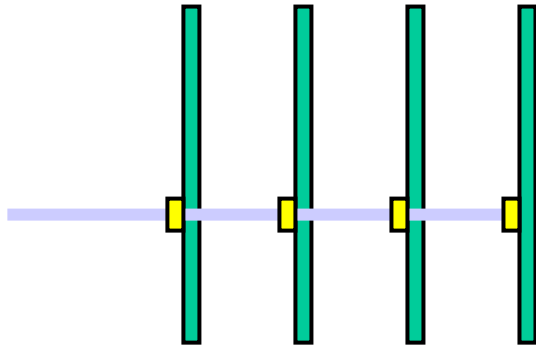1,984 planes

761,856 channels

23,808

372

X 8

64

~400 Mbps

8

Detector

Front-end Boards

Fanout/Multiplexer

Gigabit Ethernet Switch (48 port)

Processor/Buffer

Front-end links

	Multidrop	Point-to-point
Parallel		
Serial		

Front-end links

We tend to prefer serial, point-to-point links...

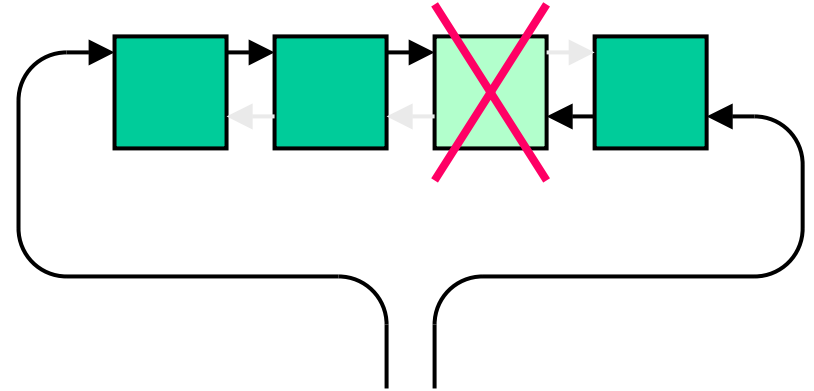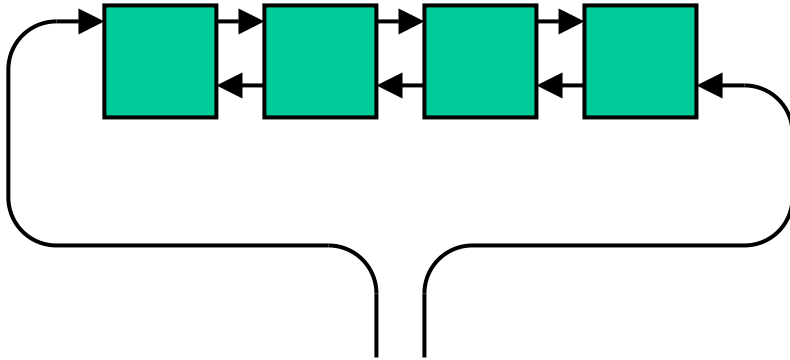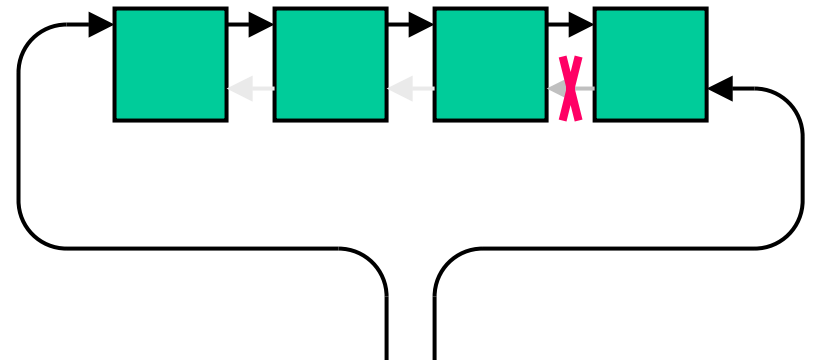| +	-
Signal integrity	Clock distribution
Termination	Active repeaters
Geographical addressing	
Bit rate per wire	

Front-end data rates are low enough for simple serial links
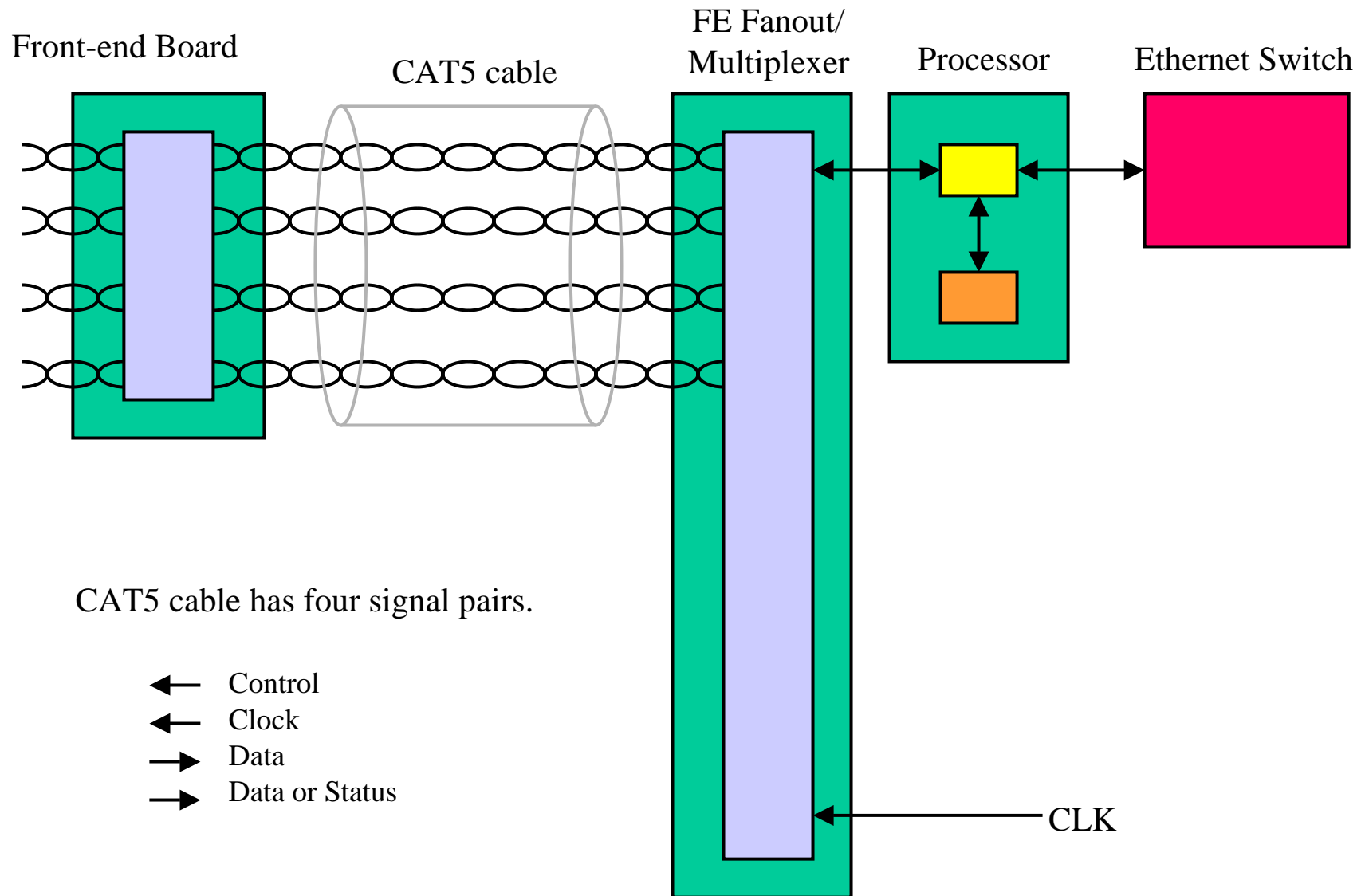
(4X oversampling, no PLL or serdes needed).
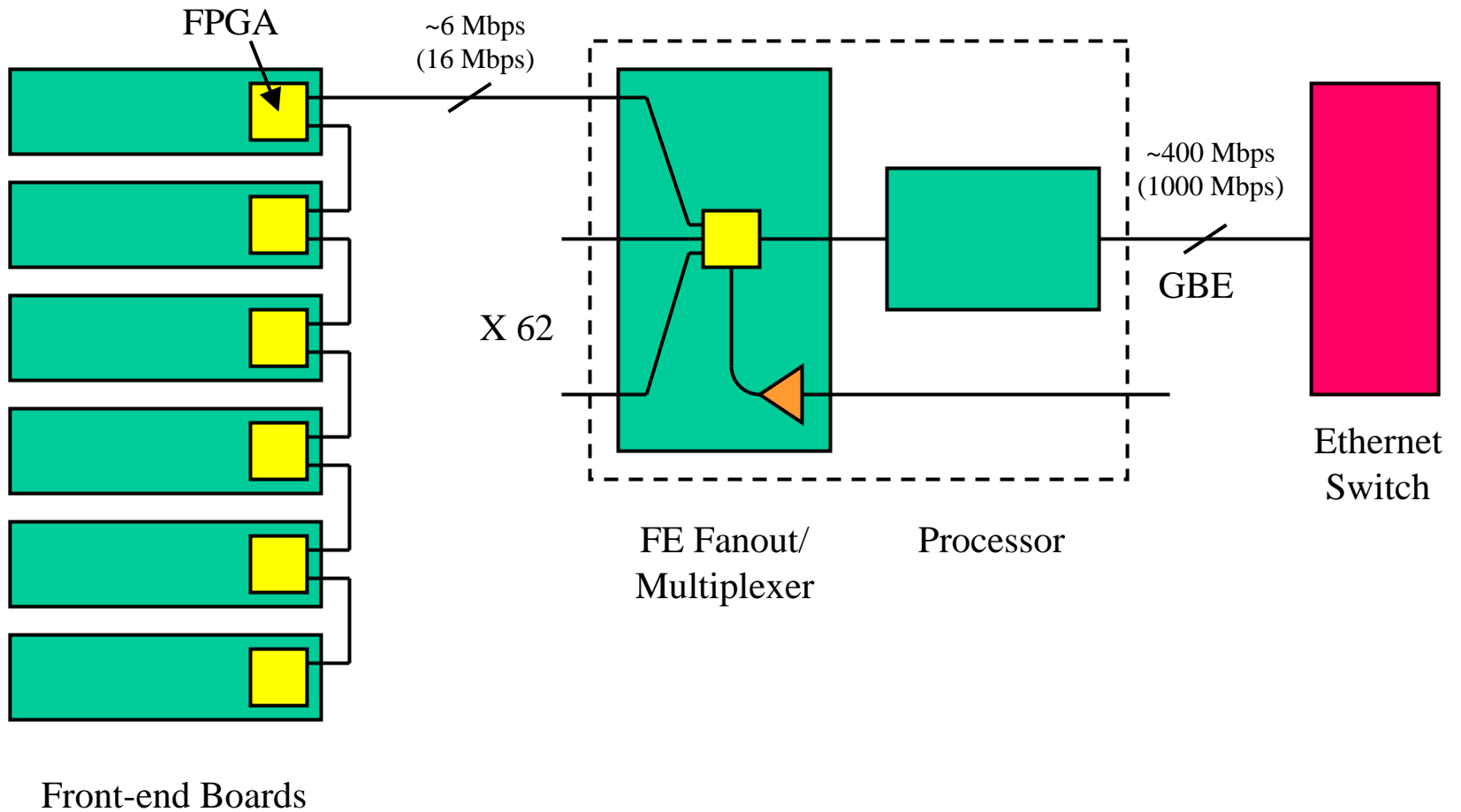
Front-end links

Redundancy using counter-rotating loops.
(doubles number of front-end links and
ports, but same back-end data rate)

Front-end Links (serial, point-to-point example)

Front-end Board

CAT5 cable

FE Fanout/
Multiplexer

Processor

Ethernet Switch

CAT5 cable has four signal pairs.

← Control
← Clock
→ Data
→ Data or Status

CLK

Front-end Interface

FPGA

~6 Mbps
(16 Mbps)

X 62

~400 Mbps
(1000 Mbps)

GBE

FE Fanout/
Multiplexer

Processor

Ethernet
Switch

Front-end Boards

Nova DAQ

FE Fanout/Multiplexer	64	$140K
GBE Switch	8	$ 10K
Processors	200	$300K
Cables	25000	$100K